

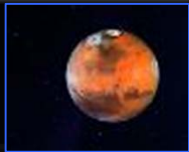
National Aeronautics and Space Administration



NASA's Space Launch System Overview

Steven Creech

Strategic Development Manager
Space Launch System (SLS) Program
April 2013



“To reach for new heights...

and reveal the unknown so that what we do
and learn will benefit all humankind.”

National Aeronautics and
Space Administration



SLS Launches in 2017

- Extend & sustain human activities across the solar system.
- Expand scientific understanding of the Earth & the universe in which we live.

NASA 2011 Strategic Plan

Advancing the U.S. Legacy of Human Exploration



The Future of Exploration



Europa
390,400,000 mi

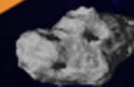


Mars
34,600,000 mi

Curiosity



**Near-Earth
Asteroid**
~3,100,000 mi



Lagrangian Point L2
274,000 mi



Moon
239,000 mi



**International
Space Station**
220 mi



Earth



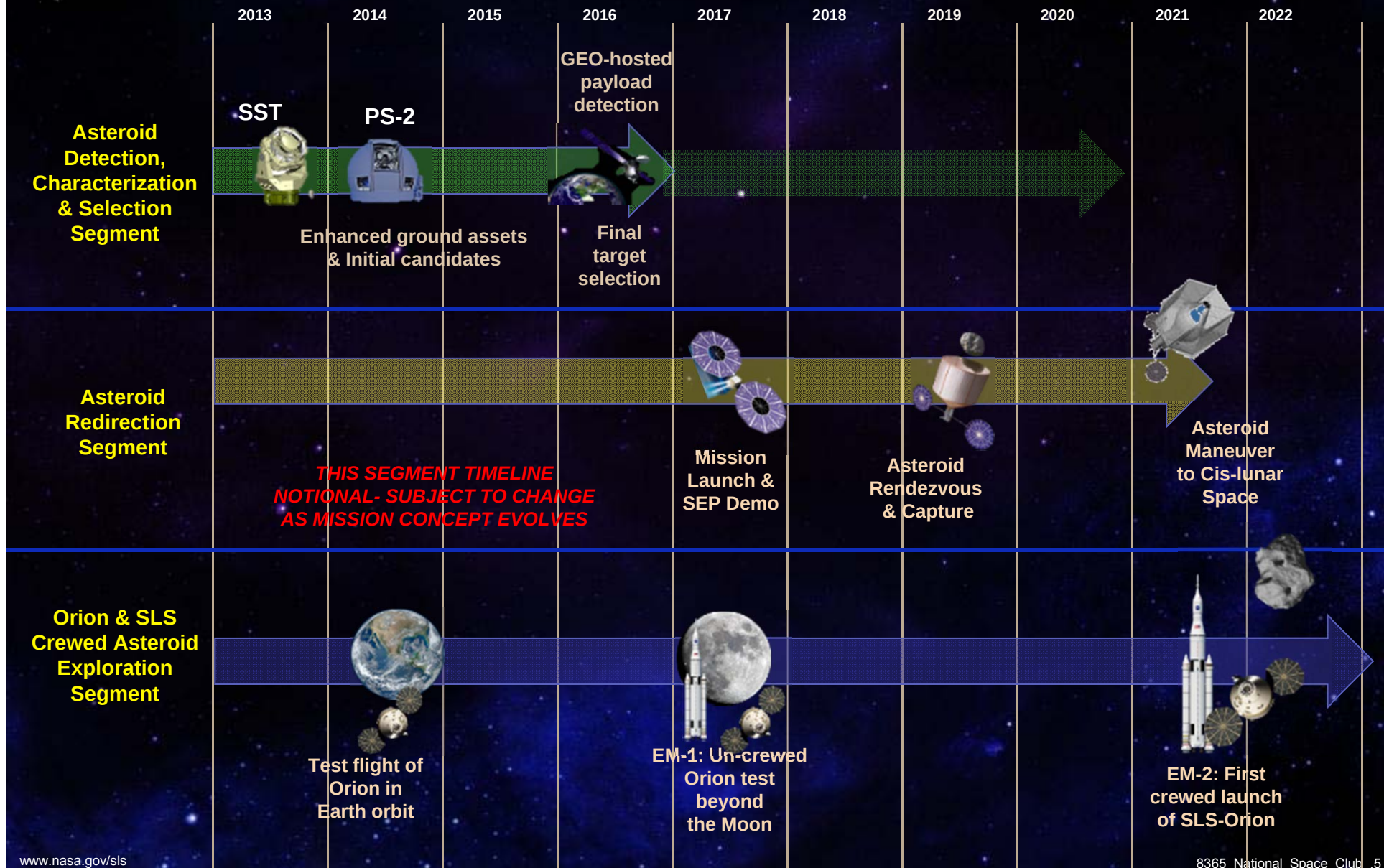
70 t



*The Space Launch System [will] be the **backbone** of its manned spaceflight program for decades. It [will] be the most **powerful** rocket in NASA's history...and puts NASA on a more **sustainable** path to continue our tradition of **innovative** space exploration.*

President Obama's Accomplishments for NASA
May 22, 2012

Asteroid Retrieval Mission



SLS Driving Objectives



◆ Safe

- Human-rated to provide safe and reliable systems for human missions
- Protecting the public, NASA workforce, high-value equipment and property, and the environment from potential harm

◆ Affordable

- Maximum use of common elements and existing assets, infrastructure, and workforce
- Constrained budget environment
- Competitive opportunities for affordability on-ramps

◆ Sustainable

- Initial capability: 70 metric tons (t), 2017–2021
 - Serves as primary transportation for Orion and exploration missions
 - Provides back-up capability for crew/cargo to ISS
- Evolved capability: 105 t and 130 t, post-2021
 - Offers large volume for science missions and payloads
 - Modular and flexible, right-sized for mission requirements



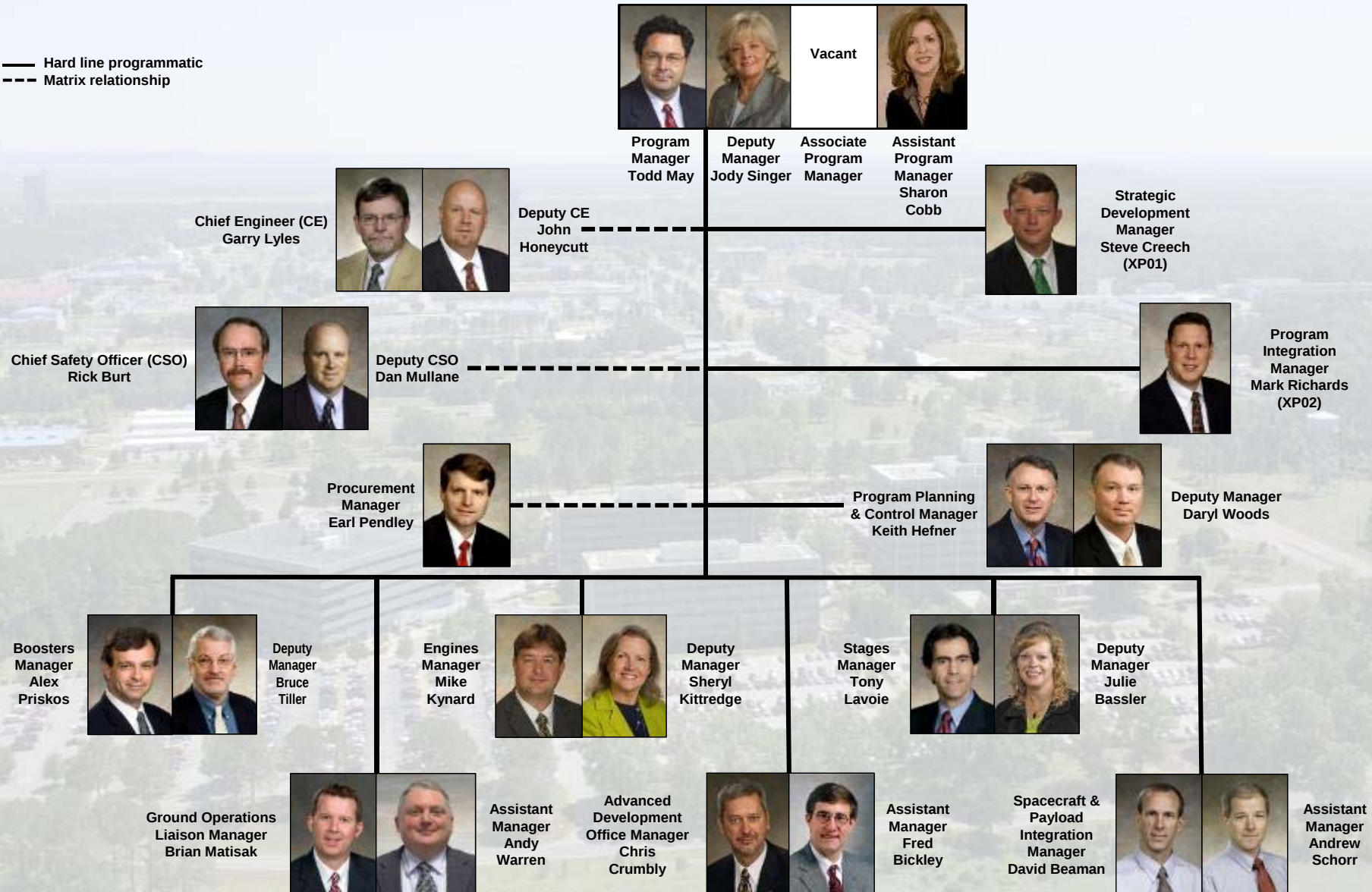
Flexible Architecture Configured for the Mission of Going Beyond Earth's Orbit

SLS Program Organization at MSFC



4/02/13

— Hard line programmatic
 --- Matrix relationship



Recent Accomplishments



Liquid Engines:

March 2013 --
Test of selective
laser melting
component on J-
2X in A-2 test
stand at Stennis
Space Center



Boosters:

January 2013 --
Solid Rocket
Booster Flight
Control Test-2 at
ATK in
Promontory, Utah

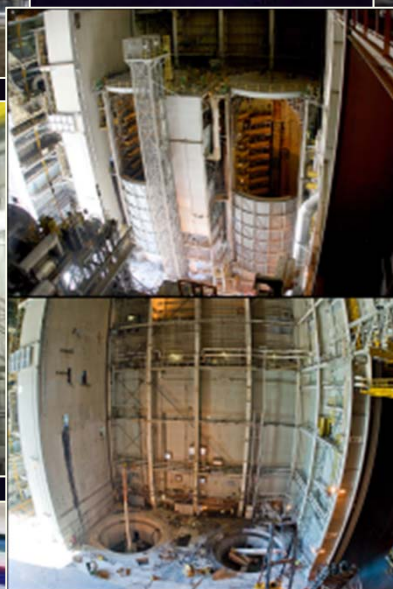


Core Stage:

December 2012 --
First test panel
for SLS Core
Stage liquid
hydrogen at
AMRO
Fabricating Corp.
in South El
Monte, Calif.

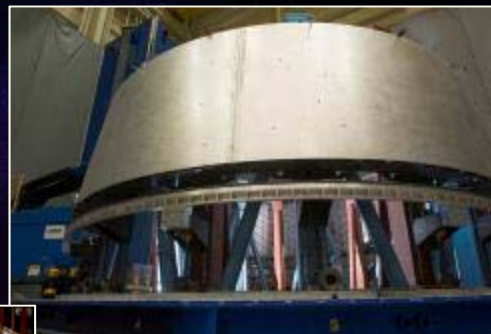


Currently Ongoing --
Refurbishment of
Michoud Assembly
Facility in Louisiana
to prepare for SLS
Core Stage
construction



Spacecraft and Payload Integration:

February 2013 --
Production of
the first flight
version of the
MSA at Marshall
Space Flight
Center



Advanced Development:

January 2013 --
F-1 engine gas
generator hot
fire test at
Marshall Space
Flight Center



Systems Engineering and Integration:

November 2012 --
SLS buffet model
in Langley
Research
Center's
Transonic
Dynamics Tunnel

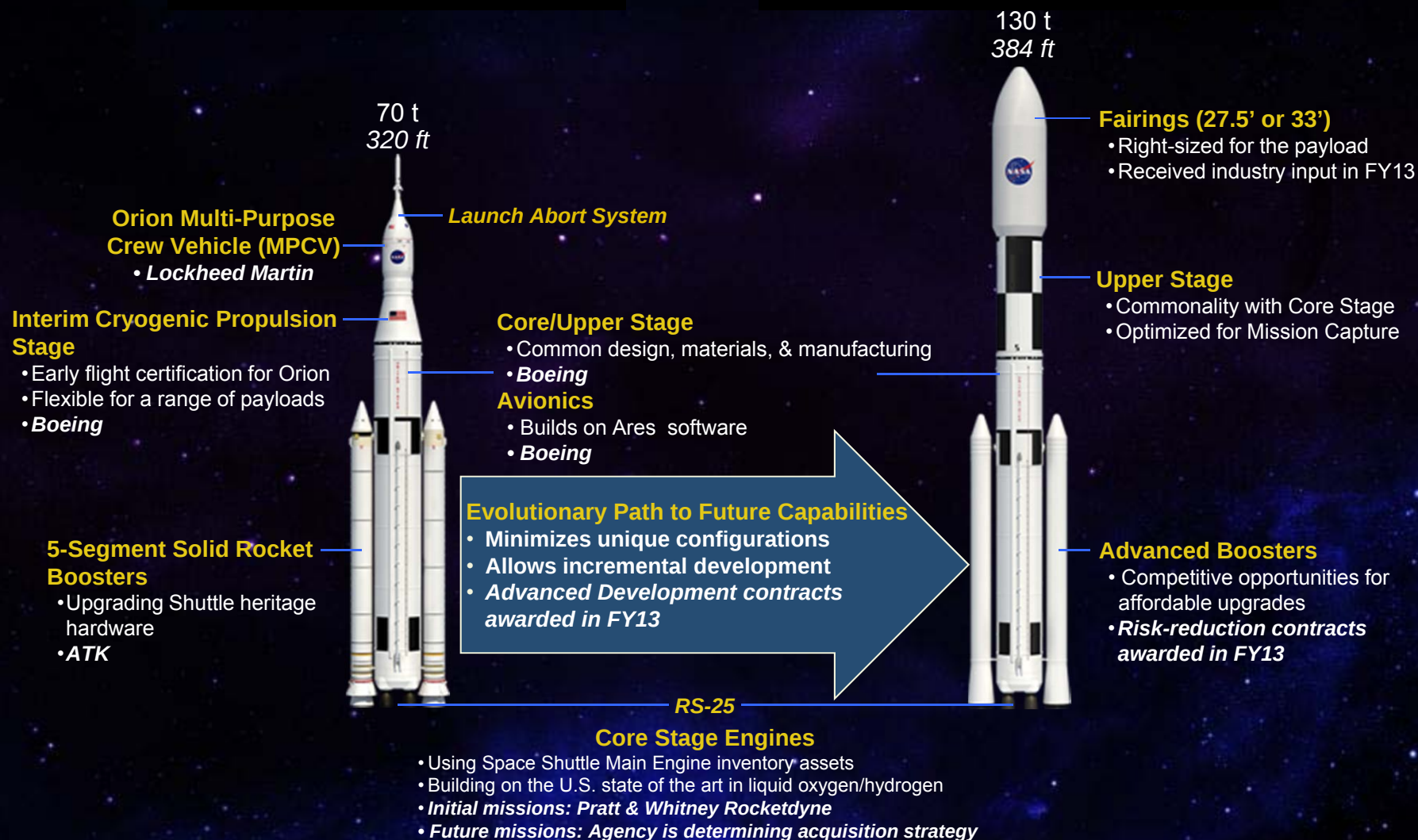


Building on the U.S. Infrastructure



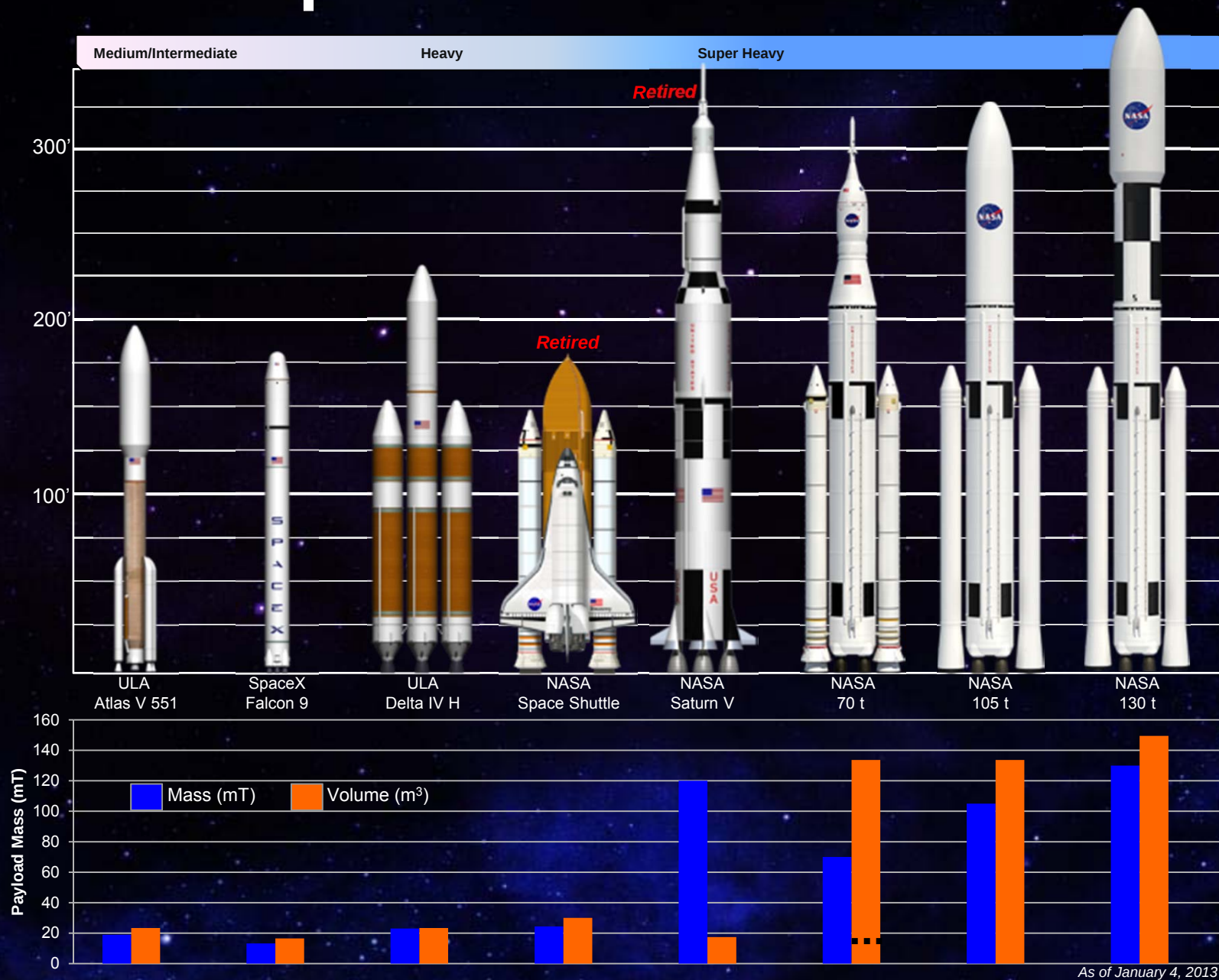
INITIAL CAPABILITY, 2017–21

EVOLVED CAPABILITY, Post-2021



Working with Industry Partners to Develop America's Heavy-Lift Rocket

Most Capable U.S. Launch Vehicle



Interim Cryogenic Propulsion Stage



Existing 5m Fairing Option



SLS Block 1
EM1/EM2 Configuration



SLS Block 1
5m Fairing Configuration



Spacecraft/ICPS
with Modified Existing Fairing

4.3 X 3.85m
Spacecraft
Envelope

*SLS is investigating utilizing existing fairings for early cargo flights
RFI responses received 12/21/12*

SLS Performance Supports Deep-Space Operations



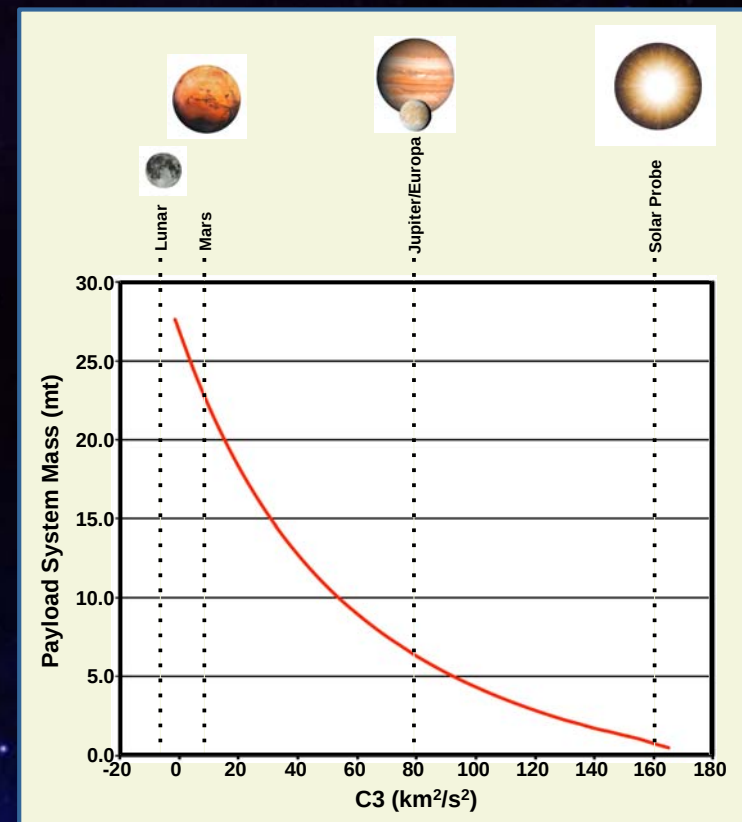
◆ SLS Enables Exploration Missions

- Greater volume and mass capability/margin
 - Increased design simplicity
 - Fewer origami-type payload designs needed to fit in the fairing
- Single launch of multiple elements means fewer launches, deployments, and critical operations
 - Simplifies on-orbit operations
 - Reduced risk
- High-energy orbit and shorter trip times
 - Less expensive mission operations
 - Reduced risk - Maximize mission reliability via Increased lift capacity and payload margin

◆ SLS investment can be leveraged for other missions requiring large volume or up mass

- Deep Space Exploration
- Planetary Landers
- Human Habitats
- Great Observatories
- Space Solar Power
- Outer Planet Missions
- Department of Defense/NRO Payloads

SLS Block 1 C3 Performance

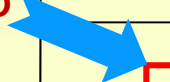


The Road to First Flight in 2017



NASA Life Cycle Phases	Approval for Formulation 	FORMULATION		Approval for Implementation 	IMPLEMENTATION		
Program Life Cycle Phases	Pre-Phase A: Concept Studies	Phase A: Concept & Technology Development	Phase B: Preliminary Design & Technology Completion	Phase C: Final Design & Fabrication	Phase D: System Assembly, Int. & Test, Launch & Checkout	Phase E: Operations & Sustainment	Phase F: Closeout
Program Life Cycle Gates and Major Events	Key Decision Point A  	KDP B  	KDP C 	KDP D   EFT-1 Launch	KDP E   EM-1 Launch	KDP F   EM-2 Launch	
Human Space Flight Project Reviews	MCR   2011	SRR/SDR   2012	PDR   2013	CDR  2015	SR  2016	FRR  2017	 2021

FOCUSED TOWARD



We don't do a good job... pointing out the monumental effort that has gone into this Program.... I don't think anyone would have thought in September [2011] that this Program might be this far so fast.

Leroy Cain, Chair
Independent Standing Review Board
(NASA Space Shuttle Program Flight Director)
NASA Directorate Program Management Council
June 29, 2012

A National Infrastructure Asset



For Beyond-Earth
Orbit Exploration
2017



For More Information

www.nasa.gov/sls

www.twitter.com/nasa_sls

www.facebook.com/nasasls

